

An Instrument for Inspecting Aspheric Optical Surfaces and Components, Phase II

Completed Technology Project (2007 - 2009)



Project Introduction

This is a Phase II SBIR proposal to develop an extremely versatile optical inspection tool for aspheric optical components and optics that are not easily inspected with conventional interferometry. Modern optical design and manufacturing procedures have begun using such components more and more in routine applications to improve optical system capability. Since the optical tolerances achieved in the manufacture of such components have an important bearing on the performance capabilities of the systems that employ them, instrumentation and techniques for precision metrology are vital for quality assurance. Inspection tools required for these types of optical components have lagged the capability to manufacture them. The proposed work will build upon a successful Phase I project that demonstrated the feasibility of a novel technique for full aperture precision metrology of such optical components. In Phase II we will deliver a complete turnkey instrument based on the Phase I research. The instrument incorporates an extremely robust, reliable, and accurate wavefront sensor for precision metrology of a transmitted or reflected wavefront, together with a projection system that covers the full aperture. Achieved through a unique combination of digital holographic interferometry, Hartmann wavefront sensing, and adaptive optics the resulting instrument will be an extremely flexible tool.

Anticipated Benefits

This program can provide a unique system for high accuracy testing of test objects and optics vital to a variety of military seeker and sensor systems. Both the US Army and the US Navy have requirements to develop metrology procedures for a new generation of infrared aspheric transmitting test objects with aerodynamic shapes that can depart from spherical by as much as millimeters. Further potential applications and commercial possibilities are predicted for systems employed in security monitoring, marine observation, and metrology.



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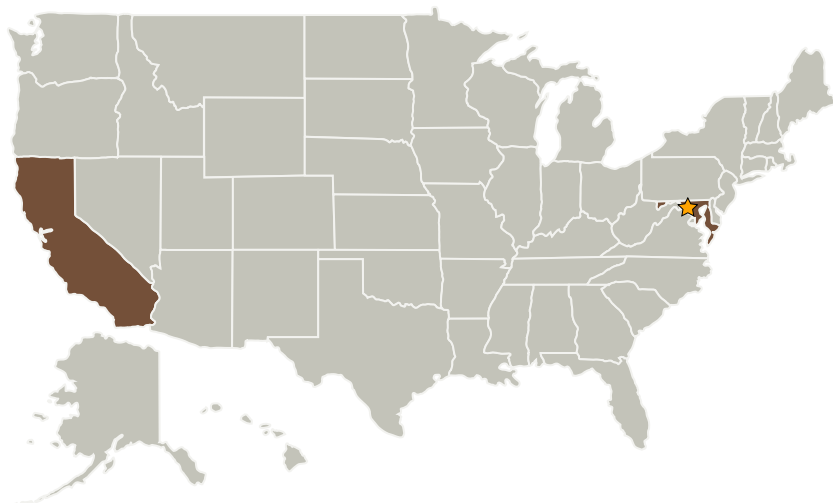
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
MetroLaser, Inc.	Supporting Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Laguna Hills, California

Primary U.S. Work Locations	
California	Maryland

Project Transitions

December 2007: Project Start

December 2009: Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Geraldine Wright

Principal Investigator:

Christina L Arnold

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - ↳ TX12.4 Manufacturing

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Technology Areas (cont.)

- └ TX12.4.3 Electronics and Optics Manufacturing Process